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EXAMINER
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Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 07-01)

	Application No.	Applicant(s)
Office Action Summary	09/522,510	WU, YOUFENG
	Examiner	Art Unit
	William H. Wood	2124

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on _18 June 2003_ .

2a) ☒ This action is **FINAL**.   2b) ☐ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
   closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) _1-32_ is/are pending in the application.

    4a) Of the above claim(s) _1 and 2_ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) _3-32_ is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.

    If approved, corrected drawings are required in reply to this Office action.

12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a) ☐ All b) ☐ Some * c) ☐ None of:

        1. ☐ Certified copies of the priority documents have been received.

        2. ☐ Certified copies of the priority documents have been received in Application No. _____ .

        3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage
            application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

    a) ☐ The translation of the foreign language provisional application has been received.

15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)	4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)	5) ☐ Notice of Informal Patent Application (PTO-152)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .	6) ☐ Other: .

DETAILED ACTION

Claims 1-32 have been examined.

Claim Rejections - 35 USC § 112

1.   Claims 23-26 and 29 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 23 recites "A computer-implemented comprising" as the preamble to the claim. This is unclear as the to type of claim: method, apparatus, etc. Claim 29 is dependent upon itself, as the limitation is similar to a limitation in claim 16, it is regarded as dependent on claim 16 for rejection purposes.

Claim Rejections - 35 USC § 103

2.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3.   Claims 3, 5-6, 8-10 and 30-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Connors et al., "Compiler-Directed Dynamic Computation Reuse: Rational and Initial Results" in view of Roediger et al. (USPN 5,960,198) and in further view of Muller et al. (USPN 6,389,468).

In regard to claim 3, Connors disclosed the limitations:

- *A computer-implemented method comprising:*

    - *identifying a candidate reuse region* (page 164, section 4);

- *determining an input set for the candidate reuse region, wherein the input set comprises a plurality of input registers* (page 162-163, section 3.1);

- *wherein each set-value comprises an input register value for each of the plurality of input registers* (page 162-163, section 3.1);

Connors did not explicitly state *instrumenting* the code for profiling. Roediger demonstrated that it was known at the time of invention to use instrumenting profilers (column 3, line 63 to column 4, line 13). It would have been obvious to one of ordinary skill in the art at the time of invention to implement Connors' profiler with instrumentation in order to acquire the needed information as found in Roediger's teaching. This implementation would have been obvious because one of ordinary skill in the art would be motivated to use a well known method of profiling to gather specifically required information. *Executing the instrumented software* is a step in profiling instrumented software (Roediger: column 4, lines 14-31).

Connors and Roediger did not explicitly state *for each set-value, combining each of the input register values into a single value*. This is merely forming a key for the purposes of hashing. Muller demonstrated that it was known at the time of invention to use a key to access a table of information (column 4, lines 19-22; *hashing*), also Muller demonstrated combining multiple values into a single value for the purposes of accessing the table (abstract, lines 10-13; column 4, lines 14-16 and 19-22; column 115, lines 33-35). It would have been obvious to one of ordinary skill in the art at the time of invention to implement Connors' storage of reuse information (set-values and

input register values; and reuse regions) with the ability to combine information into a single value (key) to access such information for some storage as found in Muller's teachings. This implementation would have been obvious because one of ordinary skill in the art would be motivated to utilize a well-known (and thus easier to implement) technique of storing and accessing information quickly and easily, i.e. a combined key value for hashing.

In regard to claim 5, the rejection of claim 1 is incorporated and further Connors and Roediger disclosed the limitation *wherein instrumenting comprises inserting instructions to periodically sample set-values* (Connors: page 162-163, section 3.1; page 164-165, section 4.2; Roediger: column 3, lines 63 to column 4, lines 13; sampling is also common to compilers).

In regard to claim 6, Connors, Roediger and Muller disclosed the limitations:

i) *wherein the input-set comprises a plurality of input registers* (page 162-163, section 3.1)

ii) *each set-value comprises an input register value for each of the plurality of input registers* (page 162-163, section 3.1)

iii) *for each set-value, combining each of the input register values into a single value* (as above under claim 3)

In regard to claim 8, Connors disclosed the limitation *further comprising selecting the candidate reuse region as a computation reuse region* (page 165, section 4.3).

In regard to claims 9 and 10, claim 9 is a machine readable medium claim corresponding to the method claim 1 and rejected under the same reason set forth under claim 3. The claim 10 is a machine readable claim corresponding to claim 5 and are rejected based upon the claim 3 rejection and the reasoning of claim 5.

In regard to claims 30-32, the limitations of the claims correspond to the limitations of claims 3 and 4 and claims 30-32 are rejected in the same manner as claims 3 and 4. Note exclusive-or is an operation of *folding*, and indexing into a data structure is an operation in *hashing*.

4.   Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Connors et al., "Compiler-Directed Dynamic Computation Reuse: Rational and Initial Results" in view of Roediger et al. (USPN 5,960,198) and in further view of Muller et al. (USPN 6,389,468) as applied to claim 3 and further in view of Dictionary of Computing" herein referred to as Computing.

In regard to claim 4, neither Connors nor Roediger disclosed the limitations *wherein combining comprises folding each of the input register values to create folded values and concatenating the folded values.* Computing demonstrated that it was known at the

time of invention to utilize folding and hashing using a key value (page 196 and 221;

folding and *hashing*). It would have been obvious to one of ordinary skill in the art at the

time of invention to implement Connors's system with folding and hashing as found in

Computing's teaching. This implementation would have been obvious because one of

ordinary skill in the art would be motivated to use simple direct and quick methods to

access information.

5.   Claims 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Connors et al., "Compiler-Directed Dynamic Computation Reuse: Rational and Initial

Results" in view of Roediger et al. (USPN 5,960,198) in view of Muller et al. (USPN

6,389,468) as applied to claim 5 and in further view of Calder et al. "Value Profiling and

Optimization" and in further view of Buzbee (USPN 5,909,578).

In regard to claim 7, the rejection of claim 5 is incorporated, however Connors and

Roediger did not explicitly state the limitation *wherein instrumenting further comprises*

inserting instructions to profile the top N occurring set-values, where N is chosen as a

function of an expected number of reuse instances. Calder demonstrated that it was

known at the time of invention to profile the top N occurring values (page 1-2,

Introduction). It would have been obvious to one of ordinary skill in the art at the time of

invention to implement Connors and Roediger's reuse profiling with profiling the top N

occurring values as found in Calder's teaching. This implementation would have been

obvious because one of ordinary skill in the art would be motivated to use Value

Profiling to its fullest as suggested by Connors' use of Value Profiling himself. Buzbee demonstrated that it was known at the time of invention instrumenting code causes a penalty with speed (column 2, lines 37-40), thus suggesting to one of ordinary skill in the art limiting a number of profiling from instrumenation to what is expected to yield results. Anything more, would be wasteful. It would have been obvious to one of ordinary skill in the art at the time of invention to implement Connors, Roediger and Calder with the ability to capture N values if that number of reuse instances were expected to occur as suggested by the draw backs of instrumentation disclosed by Buzbee. This implementation would have been obvious because one of ordinary skill in the art would be motivated to provide as accurate as possible information during profiling, which would include if possible profiling N values if N were expected, thus allowing the profiling to be efficient and avoiding unnecessarily slowing the system.

6.   Claims 11-12 and 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Connors et al., "Compiler-Directed Dynamic Computation Reuse: Rational and Initial Results" in view of Dictionary of Computing" herein referred to as Computing in further view of Roediger et al. (USPN 5,960,198) and in further view of Muller et al. (USPN 6,389,468).

In regard to claim 11, Connors disclosed the limitations:

- *A computer-implemented method comprising: obtain register values* (page 162-163, section 3.1; page 158, Abstract)

Computing demonstrated that it was known at the time of invention to sample

periodically (page 431, top right column). Roediger demonstrated it was known at the

time of invention to have profilers that sampled (column 3, line 63 to column 4, line 13).

It would have been obvious to one of ordinary skill in the art at the time of invention to

implement Connors' profiling system with sampling abilities as found in Computing's

and Roediger's teachings. This implementation would have been obvious because one

of ordinary skill in the art would be motivated to make use of profiling techniques that

allow quick production of useful information. With this implementation Connors,

Computing and Roediger demonstrated *determining an occurrence frequency of the*

register values (by sampling).

Connors and Roediger did not explicitly state *combining each of the register values into*

a single value. This is merely forming a key for the purposes of hashing. Muller

demonstrated that it was known at the time of invention to use a key to access a table of

information (column 4, lines 19-22; *hashing*), also Muller demonstrated combining

multiple values into a single value for the purposes of accessing the table (abstract,

lines 10-13; column 4, lines 14-16 and 19-22; column 115, lines 33-35). It would have

been obvious to one of ordinary skill in the art at the time of invention to implement

Connors' storage of reuse information (set-values and input register values; and reuse

regions) with the ability to combine information into a single value (key) to access such

information for some storage as found in Muller's teachings. This implementation would

have been obvious because one of ordinary skill in the art would be motivated to utilize

a well-known (and thus easier to implement) technique of storing and accessing

information quickly and easily, i.e. a combined key value for hashing. With this

implementation Connors, Computing, Roediger and Muller demonstrated *storing the*

occurrence frequency and the single set-value in a data structure (the register values

are stored in the hashing structure based upon a periodically generated "key" of

registers).

In regard to claim 12, the rejection of claim 11 immediately above is incorporated and

further Computing and Connors disclosed the limitation *wherein periodically sampling*

comprises sampling a plurality of registers to obtain a set-value every S occurrences of

a candidate reuse region, where S is a sampling period. Computing demonstrated

sampling every S occurrences, a regular basis (page 431, top right column). It would

have been obvious to one of ordinary skill in the art at the time of invention to implement

Connors' system of region reuse dependent on memory instructions with sampling on a

regular basis as found in Computing's teachings. This implementation would have been

obvious because one of ordinary skill in the art would be motivated to use a common

method and therefore well understood method of gathering information for use in

optimizing a computer system. Connors is shown to be profiling set-values (page 162-

163, section 3.1)

In regard to claim 14, the rejection of claim 12 is incorporated and further Connors

disclosed the limitation *incrementing a profile indicator at the record* (Connors: alters

the record accordingly or else would be useless). Connors did not explicitly state

storing comprises accessing a record in the data structure as a function of the set-value.

This is merely a key into hashing. Muller demonstrated that it was known at the time of

invention to use a key to access a table of information (column 4, lines 19-22; *hashing*),

also Muller demonstrated combining multiple values into a single value for the purposes

of accessing the table (abstract, lines 10-13; column 4, lines 14-16 and 19-22; column

115, lines 33-35). It would have been obvious to one of ordinary skill in the art at the

time of invention to implement Connors' storage of reuse information (set-values and

input register values; and reuse regions) with the ability to combine information into a

single value (key) to access such information for some storage as found in Muller's

teachings. This implementation would have been obvious because one of ordinary skill

in the art would be motivated to utilize a well-known (and thus easier to implement)

technique of storing and accessing information quickly and easily, i.e. a combined key

value for hashing. With this implementation Connors, Computing, Roediger and Muller

demonstrated *storing the occurrence frequency and the single set-value in a data*

structure (the register values are stored in the hashing structure based upon a

periodically generated "key" of registers).

In regard to claim 15, the rejection of claim 12 is incorporated and further Connors,

Roediger and Computing disclosed the limitations:

i) wherein periodically sampling further comprises sampling set-values in the plurality of registers at the beginning of a candidate reuse region (Connors: page 165-166, sections 4.3 and 4.4; Connors describes determining the entry points into the reuse region and needing to profile them)

ii) the plurality of registers being input registers to the candidate reuse region (Connors: page 162, first paragraph in section 3.1)

7.   Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Connors et al., "Compiler-Directed Dynamic Computation Reuse: Rational and Initial Results" in view of Dictionary of Computing" herein referred to as Computing in further view of Roediger et al. (USPN 5,960,198) and in further view of Muller et al. (USPN 6,389,468) as applied to claim 12 and in further view of Chang (USPN 5,933,628).

In regard to claim 13, the rejection of claim 12 is incorporated, however Connors, Roediger, Muller and Computing did not explicitly state the limitations:

i) identifying a group of control equivalent candidate region entries and candidate load instructions

ii) inserting instructions prior to the group, wherein the instructions set a predicate register every S occurrences

iii) inserting profiling instructions at each of the control equivalent candidate region entries and candidate load instructions, wherein the profiling instructions are predicated on the predicate register

Chang demonstrated that it was known at the time of invention to use predicate

registers for decision control as in item iii) (Chang: column 5, line 52 to column 6, line

18). It would have been obvious to one of ordinary skill in the art at the time of invention

to implement Connors, Roediger and Computing's sampling and profiling of reuse

regions system with predicate registers utilized by code as found in Chang's teaching.

This implementation would have been obvious because one of ordinary skill in the art

would be motivated to reduce the amount of branches in the code and thus speed up

and lineate the whole operation. Official Notice is taken that it was known at the time of

invention to instrument code as little as possible and hence use a small section of

instrumentation code for multiple regions of the to be observed code, where possible as

in item i) and ii). Thus, It would have been obvious to one of ordinary skill in the art at

the time of invention to implement Connors, Roediger and Computing's sampling and

profiling of reuse regions system with functionality to insert small amounts of

instrumentation code which could observe several regions of the observable code. This

implementation would have been obvious because one of ordinary skill in the art would

be motivated to reduce the amount of damaging additional instrumentation code, and

thus improve the efficiency of the profiling operation by allowing the overall code to

behave as closely as possible to the original uninstrumented code. S occurrences is

met in the same way as in claim 12 (Computing: page 431, top right column).

8.   Claims 16, 17, 20-22 and 29 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Connors et al., "Compiler-Directed Dynamic Computation Reuse:

Rational and Initial Results" in view of Roediger et al. (USPN 5,960,198) in further view

of Calder et al. "Value Profiling and Optimization" in view of "Dictionary of Computing"

herein referred to as Computing.

In regard to claim 16, Connors disclosed the limitations:

- *identifying a candidate load instruction* (page 164-165, section 4.2, reusability
  of memory operations)

- *executing the software* (page 164-166, section 4)

Connors did not explicitly state *instrumenting the software to sample a location-value*

every S occurrences of the candidate load instruction. Roediger demonstrated that it

was known at the time of invention to use instrumenting profilers (column 3, line 63 to

column 4, line 13). It would have been obvious to one of ordinary skill in the art at the

time of invention to implement Connors' profiler with instrumentation in order to acquire

the needed information as found in Roediger's teaching. This implementation would

have been obvious because one of ordinary skill in the art would be motivated to use a

well known method of profiling to gather specifically required information. Calder

demonstrated that it was known at the time of invention to profile for location-values in

Value Profiling (page 16-23, section 6, especially page 16; page 5-11, section 3). It

would have been obvious to one of ordinary skill in the art at the time of invention to

implement Connors' system of region reuse dependent on memory instructions (a load

being one of them) with Calder's Value Profiling mechanisms. This implementation

would have been obvious because one of ordinary skill in the art would be motivated to

use Value Profiling to its fullest as suggested by Connors' use of Value Profiling himself. Computing demonstrated sampling every S occurrences, a regular basis (page 431). It would have been obvious to one of ordinary skill in the art at the time of invention to implement Connors' system of region reuse dependent on memory instructions with sampling on a regular basis as found in Computing's teachings. This implementation would have been obvious because one of ordinary skill in the art would be motivated to use a common method and therefore well understood method of gathering information for use in optimizing a computer system. Calder also disclosed *storing an occurrence frequency of the location-values into a data structure* (page 20, first full paragraph).

In regard to claim 17, the rejection of claim 16 is incorporated and further Calder disclosed the limitations:

[i] *inserting instructions in the software to count the number of times each location-value is sampled* (page 20, second full paragraph)

[ii] *inserting instructions in the software to keep track of top location-values* (page 5-11, section 3)

In regard to claim 20, the rejection of claim 17 is incorporated and further Calder disclosed the limitation *wherein inserting instructions to keep track to top location-values includes inserting sampling instructions configured to profile the top N occurrences of location-values, where N is an integer* (page 5-11, section 3).

In regard to claims 21 and 22, claim 21 is a machine readable medium claim corresponding to the method claim 16 and rejected under the same reason set forth under claim 16. The claim 22 is a machine readable claim corresponding to claim 17 and are rejected based upon the claim 16 rejection and the reasoning of claim 17.

In regard to claim 29, Connors, Roediger, Calder and Computing further comprising: identifying a candidate load instruction within the candidate reuse region; and instrumenting the software to profile location-values for the candidate load instruction (as above under claim 16).

9.   Claims 18 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Connors et al., "Compiler-Directed Dynamic Computation Reuse: Rational and Initial Results" in view of Roediger et al. (USPN 5,960,198) and in further view of "Dictionary of Computing" herein referred to as Computing in view of Calder et al. "Value Profiling and Optimization" as applied to claim 16 and in further view of Chang (USPN 5,933,628).

In regard to claim 18, the rejection of claim 16 is incorporated, however Connors, Roediger, Calder and Computing did not explicitly state the limitations:

   i) *identifying a group of control equivalent candidate region entries and candidate load instructions*

ⁱⁱ⁾ *inserting instructions prior to the group, wherein the instructions set a predicate*

register every S occurrences

ⁱⁱⁱ⁾ *inserting profiling instructions at each of the control equivalent candidate region*

entries and candidate load instructions, wherein the profiling instructions are

predicated on the predicate register

Chang demonstrated that it was known at the time of invention to use predicate

registers for decision control (Chang: column 5, line 52 to column 6, line 18). It would

have been obvious to one of ordinary skill in the art at the time of invention to implement

Connors, Roediger, Calder and Computing's sampling and profiling of reuse regions

system with predicate registers utilized by code as found in Chang's teaching. This

implementation would have been obvious because one of ordinary skill in the art would

be motivated to reduce the amount of branches in the code and thus speed up and

lineate the whole operation. Official Notice is taken that it was known at the time of

invention to instrument code as little as possible and hence use a small section of

instrumentation code for multiple regions of the to be observed code, where possible as

in item i) and ii). Thus, It would have been obvious to one of ordinary skill in the art at

the time of invention to implement Connors, Roediger, Calder and Computing's

sampling and profiling of reuse regions system with functionality to insert small amounts

of instrumentation code which could observe several regions of the observable code.

This implementation would have been obvious because one of ordinary skill in the art

would be motivated to reduce the amount of damaging additional instrumentation code,

and thus improve the efficiency of the profiling operation by allowing the overall code to

behave as closely as possible to the original uninstrumented code. S occurrences is

met in the same way as in claim 12 (Computing: page 431, top right column).

In regard to claim 19, the rejection of claim 17 is incorporated and further Calder

disclosed the limitations:

    [i] *wherein the candidate region includes a plurality of candidate load instructions*

    (page 164-165, section 4.2; memory operations include load instructions)

Calder did not explicitly state *each of the plurality of load instructions being predicted on*

a common predicate register. Chang demonstrated that it was known at the time of

invention to use predicate registers for decision control (Chang: column 5, line 52 to

column 6, line 18). It would have been obvious to one of ordinary skill in the art at the

time of invention to implement Connors, Roediger, Calder and Computing's sampling

and profiling of reuse regions system with predicate registers utilized by code as found

in Chang's teaching. This implementation would have been obvious because one of

ordinary skill in the art would be motivated to reduce the amount of branches in the

code and thus speed up and lineate the whole operation.

10.   Claims 23 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable

over Connors et al., "Compiler-Directed Dynamic Computation Reuse: Rational and

Initial Results" in view of Calder et al. "Value Profiling and Optimization".

In regard to claim 23, Connors disclosed the limitations concerning profiling set-values

for selecting a canidate reuse region to be used based on probability (page 164-165,

section 4.2; page 158-159, Introduction), however Connors did not explicitly state

profiling top set-values to produce a probability the reuse region should be selected.

Calder demonstrated that it was known at the time of invention to utilize top values

(Calder: page 5-11, section 3). It would have been obvious to one of ordinary skill in

the art at the time of invention to implement Connors' set-values of reuse regions with

top values as found in Calder's teaching. This implementation would have been

obvious because one of ordinary skill in the art would be motivated to fully implement

the functionality of value profiling, which itself was suggested by Connors page 164.

Calder also disclosed *storing an occurrence frequency of the location-values into a data

structure* (page 20, first full paragraph).

In regard to claim 27, claim 27 is a machine readable medium claim corresponding to

the method claim 23 and rejected under the same reason set forth under claim 23.

11.   Claims 24-26 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable

over Connors et al., "Compiler-Directed Dynamic Computation Reuse: Rational and

Initial Results" in view of Calder et al. "Value Profiling and Optimization" as applied to

claim 23 and in further view of Muller et al. (USPN 6,389,468).

In regard to claim 24, Connors did not explicitly state *for each set-value, combining each of the input register values into a single value*. This is merely forming a key for the purposes of hashing. Muller demonstrated that it was known at the time of invention to use a key to access a table of information (column 4, lines 19-22; *hashing*), also Muller demonstrated combining multiple values into a single value for the purposes of accessing the table (abstract, lines 10-13; column 4, lines 14-16 and 19-22; column 115, lines 33-35). It would have been obvious to one of ordinary skill in the art at the time of invention to implement Connors' storage of reuse information (set-values and input register values; and reuse regions) with the ability to combine information into a single value (key) to access such information for some storage as found in Muller's teachings. This implementation would have been obvious because one of ordinary skill in the art would be motivated to utilize a well-known (and thus easier to implement) technique of storing and accessing information quickly and easily, i.e. a combined key value for hashing.

In regard to claim 25, Connors did not explicitly state *wherein accessing a data structure comprises accessing a data structure at least as large as a number of expected reuse instances*. Official Notice is taken that it was known at the time of invention to create a structure large enough to hold all the expected values needed. It would have been obvious to one of ordinary skill in the art at the time of invention to implement Connors' Computation Reuse Buffer as being as large as necessary for all expected reuse regions. This implementation would have been obvious because one of ordinary skill in

the art would be motivated to improve as much of the code as possible for better

optimization.

In regard to claim 26, Connors disclosed the limitations *wherein selecting comprises*

marking as reuse regions those candidate reuse regions having a finite number of top

set-values that have probability of occurrence greater than a threshold (page 159, left

column, first full paragraph; clearly some threshold must be used to gauge the

effectiveness of the profiling, which produced some heuristics).

In regard to claims 28, claim 28 is a machine readable medium claim corresponding to

the method claim 24 and rejected under the same reason set forth under claim 24.

Response to Arguments

12.   Applicant's arguments with respect to claims 3-32 have been considered but are

moot in view of the new ground(s) of rejection.

13.   Applicant states "storing the occurrence frequency" was argued under claim 3

(page 15 of paper 6), however this argument was not found.

14.   Applicant states claim 21 has been amended (page 15 of paper 6). This is not

the case.

15.   In response to applicant's argument that the examiner's conclusion of

obviousness is based upon improper hindsight reasoning, it must be recognized that

any judgment on obviousness is in a sense necessarily a reconstruction based upon

hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

Conclusion

16.   Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Correspondence Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to William H. Wood whose telephone number is (703)305-3305. The examiner can normally be reached 7:30am - 5:00pm Monday thru Thursday and 7:30am - 4:00pm every other Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kakali Chaki can be reached on (703)305-9662. The fax phone numbers for the organization where this application or proceeding is assigned are (703)746-7239 for regular communications and (703)746-7238 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)305-3900.

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September 1, 2003

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